REMARKS

Claims 16-35 are presently in the application. Claims 22-27 have been canceled herein. The above amendments are being made to place the application in better condition for examination.

The drawings were objected because reference characters "27" and "24" have both been used to designate a "spring element."

Clearly the drawings show that spring elements "24" and "27" are different elements. Paragraph [0027] has been amended to refer to element "24" as the "first spring element" to overcome the objection.

Claims 28, 32, and 33 were rejected under 35 USC 112, second paragraph, as being indefinite. These claims have been corrected for insufficient antecedent basis.

Reconsideration of the rejection of claims 16-21 and 3 under 35 U.S.C. 102(b) as being anticipated by US 200310034594 to Schmieder is respectfully requested.

Claim 16 is directed to a fuel injector for internal combustion engines, comprising

a high-pressure fuel reservoir,

a pressure booster received in a booster housing,

an injection valve member that has at least one booster portion and that has one needle portion that closes at least one injection opening, a first spring element which surrounds the booster housing, wherein ***the pressure booster is directly braced against the first spring element***, and

a nozzle housing part that encloses the injection valve member , wherein ***the booster housing is pressed against the nozzle housing part by the first spring element***, the booster

portion of the injection valve member is enclosed by a sleeve, the sleeve laterally defining and sealing off a booster chamber, and the booster chamber being defined on two diametrically opposite sides by a lower end face of the pressure booster and by an end face of the booster portion of the injection valve member.

Schmieder is relied upon for disclosing a piston (4) received in a housing/case (5). An annular shoulder piece (13) of the piston is indirectly braced on a spring bushing (8) through an adjusting piece (12) of the housing (5). The examiner interprets that the housing (5) is fixed on a nozzle housing part (see Office action, page 5). Schmieder also discloses injector housing part (10) and a piezoelectric actuator (2, 3).

The invention differs from Schmieder as the booster housing (9) of the invention is directly braced on the spring element (27), and the booster housing is directly fixed on the valve member encompassing housing part (15). The elements (4-7) relied upon by the examiner are essentially part of a hydraulic coupler and part of a servo valve located directly below the hydraulic coupler.

In Schmieder, a fixed spring element B and a further spring element without reference numeral (a spiral spring is shown) are disclosed. The spring element (8) is braced on the disk (12) and presses the booster housing (5) against a housing part of the fuel injector. However, the teaching in Schmieder relates not to a fuel injector with a directly triggered injection valve but rather to a servo valve, in which the piezoelectric actuator (3) acts via a hydraulic coupler on a mushroom-shaped valve element which causes a control chamber of an injection valve member, not shown, to communicate with a low-pressure return system, or closes that chamber.

In the fuel injector of the present invention, the injection valve member is triggered directly by the piezoelectric actuator, in that the piezoelectric actuator exerts a pulling motion (in the direction of the arrow 46) and as a result increases the volume in the coupler chamber (20), causing the injection valve member to lift from the nozzle needle seat (17). By means of the different pressure faces (47 and 48), the relatively short stroke of the piezoelectric actuator (43) is boosted to a longer stroke of the injection valve member.

In Schmieder, the hydraulic coupler that is merely shown is connected between the piezoelectric actuator (3) and the mushroom-shaped valve element shown at the bottom, in order to compensate for thermal differences between the piezoelectric actuator and the metal housing, so that when the actuator is relieved, the mushroom-shaped valve element is always closed.

In Schmieder, upon actuation of the piezoelectric actuator, this actuator presses on the closed valve element via the hydraulic coupler chamber 7 and, by the stroke of the piezoelectric actuator, opens the hydraulic communication between the control chamber, not shown, and a low-pressure chamber, so that the control chamber of the injection valve member is pressure-relieved into a low-pressure return system, not shown. In the present invention, there is no such return. The fuel injector has only a high-pressure inlet 7.

Schmieder does not disclose or suggest the combination and structural arrangement of the recited elements of the pressure booster, the at least one booster portion, the first spring element, the pressure booster being directly braced against the first spring element, the nozzle housing part, the booster housing being pressed against the nozzle housing part by the first

spring element, the sleeve, and the booster chamber, as required under 35 USC 102(b). Accordingly, withdrawal of the rejection is respectfully requested

Reconsideration of the rejection of claims 16, 32 and 34 under 35 U.S.C. 102(e) as being anticipated by US 20060043209 to Magel is respectfully requested.

Magel discloses a high pressure fuel reservoir (2), a pressure booster (14), an injection valve member with "booster" portion (28) and needle portion (24), a housing (36) braced on a spring element (38), a first spring chamber (12), a second spring chamber (20) surrounding the "booster" portion (28), at least one groove (29) in a step, an annular gap (17), and grooves (21) in a housing part.

Magel is deficient as the booster housing (36) relied upon by the examiner is not fixed on a nozzle housing part that encloses the valve member (28, 24), element 9 or 10 in Magel. Contrary to this the booster housing (36) is fixed on the housing part (8) which encloses the booster piston extension (34).

Magel does not disclose or suggest the combination and structural arrangement of the recited elements of the pressure booster, the at least one booster portion, the first spring element, the pressure booster being directly braced against the first spring element, the nozzle housing part, the booster housing being pressed against the nozzle housing part by the first spring element, the sleeve, and the booster chamber, as required under 35 USC 102(b). Accordingly, withdrawal of the rejection is respectfully requested

Reconsideration of the rejection of claims 22-28, and 35 under 35 U.S.C. 103(a) as being unpatentable over Schmieder is respectfully requested.

The examiner relies on Schmieder to disclose all of the elements of claims 22-25 (now the subject matter of claim 16) and a booster housing (5) that performs the functions of both the booster housing and sleeve, which is lacking. However, as discussed above, Schmieder is deficient as a reference and further does not render obvious the recitations of claim 16. Accordingly withdrawal of the rejection is respectfully requested

Reconsideration of the rejection of claims 29-30 under 35 U.S.C. 103(a) as being unpatentable over Schmieder in view of US 4083498 to Cavanagh is respectfully requested.

The examiner relies on Schmieder to discloses all of the elements of claim 29 including a guide portion and needle guide, except the injection valve member having a ground surface. Cavanagh teaches a valve member that has been ground to the desired shape.

Schmieder in view of Cavanagh fails to show when taken alone or combined the combination of the elements according to claim 16 including the arrangement of the pressure booster, the at least one booster portion, the first spring element, the pressure booster being directly braced against the first spring element, the nozzle housing part, the booster housing being pressed against the nozzle housing part by the first spring element, the sleeve, and the booster chamber, as required under 35 U.S.C 103(a). Therefore, it is respectfully requested that the rejection of the claims be withdrawn.

Reconsideration of the rejection of claim 33 under 35 U.S.C. 103(a) as being unpatentable over Magel in view of US 626077 Popp is respectfully requested.

Magel is relied upon by the examiner for disclosing all of the elements of claim 33, as cited above, including a pressure chamber (23) surrounding the needle portion and the second spring chamber and pressure chamber communicating hydraulically, except for a ground and

polished surface of the injection valve member. Popp teaches the use of grinding of injector valves and seats in order to provide precise alignment, long seat life, and low leakage.

Magel in view of Popp fails to show when taken alone or combined the combination of the elements according to claim 16 including the arrangement of the pressure booster, the at least one booster portion, the first spring element, the pressure booster being directly braced against the first spring element, the nozzle housing part, the booster housing being pressed against the nozzle housing part by the first spring element, the sleeve, and the booster chamber, as required under 35 U.S.C 103(a). Therefore, it is respectfully requested that the rejection of the claims be withdrawn.

Entry of the amendment is respectfully solicited.

Respectfully submitted,

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